Rehabilitation Principles of Lumbar Instability in the Athlete

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Objectives
- Discuss common causes of lumbar instability
- Determine the clinical presentation of an athlete with lumbar instability
- Discuss the difference between segmental instability and clinical instability
- Address common sports that result in lumbar instability
- Discuss the prioritization of treatment in athletes with lumbar instability

Causes of Instability
- Disc degeneration-normal
- Trauma (macro or micro)
- Repetitive positioning particularly extension
- History of recurrent low back pain
- Post operative (fusion, decompression etc...)

Segmental Instability
- Passive restraints are either not intact or damaged
- Examples
  - Spondylolysis- pars interarticularis fracture
  - Spondylolisthesis-anterior slippage
  - Ligament tears
  - Disc herniation resulting in slippage

Clinical Instability
- Also referred to as hypermobility (change in neutral zone)
- Excessive joint motion but passive restraints remain intact ie bone, ligaments, capsule etc...
- Loss of neuromuscular control and deep stabilizer activation
- Mid range dysfunction (transitional movements)

Mechanism of Stability
Motor control programs coordinate global and local muscle recruitment and influence intrinsic and reflexive mechanisms to provide appropriate trunk muscle stiffness and dynamic stability around a neutral spinal posture during multiplanar movements.
Most Common Athletes who suffer from Lumbar Instability

- Golf (C curve)
- Volleyball
- Gymnasts
- Dance
- Tennis
- Swimming

Clinical Prediction Rule

Variables that significantly predicted a 50% improvement in disability from LBP at 4 weeks.

- Age less than 40 years
- Aberrant motion
- SLR > 90
- Positive Prone Instability Test

At least 3 present

Clinical Tests to Diagnose Lumbar Segmental Instability: A Systematic Review

11 clinical test and 351 patients met the inclusion criteria

Findings

The Passive Leg Extension test was found to have the highest combined sensitivity and specificity, as well as the highest +LR

- Should include this test along with CPR to diagnose lumbar instability clinically.
Arthrokineamatics in a Subgroup of Patients Likely to Benefit From a Lumbar Stabilization Exercise Program

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20 patients met inclusion criteria, 20 patients were controls

Inclusion and Exclusion Criteria for Subjects With Low Back Pain Who Were Predicted to Succeed With a Lumbar Stabilization Exercise Program.17

<table>
<thead>
<tr>
<th>Variable</th>
<th>Accuracy Statistic*</th>
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<tbody>
<tr>
<td>Predictors of success</td>
<td>Predictive glucose intolerance test</td>
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<tr>
<td></td>
<td>Average straight leg raise &lt; 90°</td>
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<td></td>
<td>Age &lt; 40 yrs</td>
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<tr>
<td>Predictors of failure</td>
<td>Negative predictive test</td>
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<td></td>
<td>Hypomobility with straight leg raising</td>
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<td>Abdominal muscle weakness</td>
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*I values represent accuracy ratios with 95% confidence intervals presented.

| Abdominal muscle weakness was defined as having 1 of the following 5 variables present during flexion and extension: abdominal pain in anterior, partial pain in posterior, lower back pain, instability catch, or reversal of pain on flexion and extension.

Teyhen D S et al. PHYS THER 2007;87:313-325

Findings

-This research provided construct validity for the Lumbar Stabilization Exercise Program (LSEP) CPR
-Individuals with LBP who are likely to succeed with an LSEP may have some combination
  • altered segmental structural integrity,
  • segmental stiffness, and
  • altered neuromuscular control during lumbar spine movement.

So How do we treat this?

• Segmental Stability
  – Brace or no brace?
  – If immobilized, how long?
  – Flexion based exercises- AVOID extension!!!
  – Patient education

Often times looks like a mechanical dysfunction= DO NOT MANIPULATE!!

Hypomobility above and below the area of instability

THORACIC SPINE

HIPS
Motor Control to Dynamic Stabilizers

Transverse Abdominus

- Bracing
- Short Lever Arm Exercises
- Long Lever arm exercises

Strengthen Abdominals and Trunk Musculature

### Outcome Measures

- **Rate of complete recovery**: 8 weeks or more
- **Subjective Measures**
  - Modified Oswestry
- **Physical Performance Test**
  - Supine Leg Lowering
  - Isometric Chest Rise
  - Modified Sorensen